ANNOUNCEMENT

Dated: 16th April, 2025

No. Met4-14/6/2024 (R&D)
Government of India
Ministry of Mines

Invites Science and Technology Project Proposals
under R&D Component of Science and Technology Programme of Ministry of Mines

Projects are invited from Academic Institutions, Universities, National Institutes and R&D Institution recognized by the Department of Scientific and Industrial Research, Government of India, for up to 3 years duration on the **following topics of directed R&D and in the following thrust areas** which have direct bearing on mineral sector, applied and sustainable aspect of mining and industrial applications:

2. TOPICS FOR DIRECTED R&D

A. Critical metals

Gallium	● **Gallium recovery from Bayer Liquor**: Extraction of Gallium from Bayer Liquor (mgpl level to gpl) and development of agents and chemicals for extraction of Ga and extraction.
Niobium, Tantalum	● **Recovery of Nb/Ta from primary ore.**
Niobium, Tantalum	● **Recovery of Nb/Ta from tin slag**: Development of process / technology for extraction of Nb & Ta from tin slag
PGE	● **Extraction of PGE/ Nickel** from Ultrabasic rock. ● **Extraction of Pt, Pd, Rh** from spent catalytic convertors
Nickel & Lithium	● **Recovery of Li/Ni from waste battery**: Cost effective process and technology for recovery of Nickel and Lithium from scrap battery
Lithium	● **Recovery of Li from new deposits:** Process flow sheets for Li beneficiation to be developed for new GSI finds and from Brine / salt beds.
Tungsten	● **Recovery of W from tool waste/ BGML dumps**: Development of process and technology for recovery of Tunsten from tool waste and BGML mill dumps
Germanium	● **Recovery of Ge from Pb-ZN circuit**: Process development for recovery of Germanium from lead-Zinc circuit. E-waste is another source, for Ge recovery.
Selenium and Tellurium	● **Recovery Se /Te from anode slimes**: Process / technology development for recovery of Se &Te from copper anode slimes
Indium	● Recovery of **Indium** from the sphalerite ore.
All Critical Minerals	● Recovery, Extraction and Beneficiation of **Critical Minerals / trace elements** from tailings / mine dumps

B. Rare Earth

- **Solvent extraction Chemicals**: Development of chemicals with higher separation ratios to reduce the number of stages in separation of Rare Earths chloride solutions (100-250gpl)
- **Chemicals for ion-exchange columns**: Development of new chemicals with higher selectivity and separation factors for Ion-Exchange columns for RE ion extraction.
- **Film Chromatography**: Development of high Speed Film Chromatography solutions for Individual RE metal separations and speciality chemicals for Film chromotography separation of individual RE metals.
- **REE recovery from khondalite**: Process design for treatment and process for extraction of REE and metal values from Khondalite or similar low value minerals.
  Beneficiation of lean / scattered strategic minerals: Development of mining techniques such as In-situ leaching and Electro-kinetic mining to be taken up for exploitation of lean and scattered strategic mineral occurrences. These advanced mining techniques eliminates excavation of large mass of earth's surface and sub-surface.
- **Recovery of REEs from e-waste**: Integrated technology development for recycling of e-waste to recover critical elements such as Li, rare-earths, Co, Ni, etc. (Urban Mining)

C. Recycling / Circular Economy

- **Laser Induced Brake Down Spectroscopy**: Development of a low cost automated system able to separate aluminium alloys using laser-induced plasma to analyze the composition of materials for rapid and accurate sorting and identification of metals in complex mixtures.
- **Artificial intelligence and Machine learning**: Development of metal scrap sorting technology based on color and shape-based which utilizes advanced imaging and computer vision techniques to identify and classify metal scraps
- **Electrochemical process**: Development of process / technology for metal recovery from e-waste which uses less solvent (minimal reagent) and shows convenient and precise control, reduced energy consumption, and low environmental impact
- **Hydrometallurgical process:** Development of technology for metal scrap recycling including selective leaching, solvent extraction, ion exchange resins, etc
- **Internet of Things (IoT) and sensor-based technologies**: Development of processes for metal recycling to enable real-time monitoring, optimize resource allocation, and improve overall operational efficiency
- **Collaborative robotics:** Development of robots also known as cobots, use cameras, robotic arms, grippers, and conveyor systems to lift, move, and stack materials as needed, and can perform a wide range of tasks such as material handling, assembly, inspection, and maintenance alongside human workers.
- **Heavy Media Separation**: Development of technology for scrap sorting based on density difference with higher separation efficiencies

D. Energy Efficiency

- **Energy recovery systems**: Designing of low cost heat exchangers or regenerative burners, which can support metal recycling industry for effectively tackling energy losses by capturing and repurposing waste heat generated during the recycling process. Through this approach, the industry can optimize energy utilization and minimize wastage, contributing to improved energy efficiency and sustainability in metal recycling practices.
- **Hydrogen Production by dross**: Process / Technology development for production of hydrogen from dross
- **Energy Efficiency of Anodes**: Development of new material for enhancement of energy efficiency of carbon anode for aluminium production with low carbon footprint (development of materials)
- **Energy Efficient pit furnace**: Design and development of pit furnaces with energy efficiency of more than 40%

E. New Material / Processes

- **Vapor technology for extraction of Nickel/ PGE etc.**
- **Atomised Ferro-silicon powder:** Development of **ferro** silicon powder for heavy media separation of metal scrap
- **High Conductivity copper**: Development of copper wire with more than 98% conductivity from armature & EoL electronics & machinery scrap
- **Coating for copper to prevent oxidation:** Copper gets oxidised during transportation and non-reactive and non-interference coating to be developed for preventing the oxidation.
- **Aluminium Casting Anodising:** Process / Technology for anodising high Si castings (5- 11)%
- **Aluminium casting:** SoPs for obtaining uniform composition while casting molten aluminium
- **Bulk utilisation of secondary dross:** Development of process for converting dross into flux material for steel industry
- **Homogenisation of melt:** Processes/ technology for obtaining uniform melt chemistry
- **Potash Extraction:** Process/ technology for Potash extraction from the nepheline syenite rocks
- **Zinc Recovery:** Development of technology for recovery of Zn from EAF/IF ash
- **Feasibility of economic mining of Rajasthan Potash evaporite basin.**

3. THRUST AREAS OF RESEARCH IN MINES

The broad thrust areas for supporting Research in Mining are given below:

i. Prospecting/exploration for strategic rare and rare earth minerals.
ii. Development of new technology for mineral exploration and mining on land and deep sea to locate and exploit new mineral resources.
iii. Research in mining methods. This includes rock mechanics, mine designing, mining equipment, energy conservation, environmental protection and mine safety.

iv. Improve efficiency in process, operations, recovery of by-products and reduction in specification and consumption norms.
v. Research in metallurgy and mineral beneficiation techniques to utilize lower grade and finer size ores.
vi. Extraction of value added products from mine waste, plant tailings etc.
vii. Development of new alloys and metal related products, etc.
viii. Evolve low capital and energy saving processing systems.
ix. Production of materials of high purity.
x. Cooperative research among organizations associated with the mineral sector.
xi. Decarbonisation and development of green technology in mineral based industries
xii. R&D to establish circular economy and use of recycled materials in mineral based industry
xiii. Focus on extraction of strategic, critical and REE at elemental level

4. **i.** As per guidelines, project proposals should meet following **mandatory requirements**:

a. Industry participation in the form of at least 20% financial contribution (between cash and kind contribution, at least 15% cash contribution)
OR
MSME participation in the form of at least 10% financial contribution (between cash and kind contribution, at least 5% cash contribution). MSME Certificate to be furnished at the time of applying of projects.
b. R & D proposals should be targeting TRL 3 to 7, in the identified thrust areas
c. Sample collection and its first level characterization should precede proposal submission.
d. the institute should have analysis capability or Prior tie-up with other institute in this regard

ii. Notwithstanding the provisions mentioned at 4.i above, project proposals are also invited towards carrying out below TRL-3 research without industry participation with a ceiling of Rs. 10 lakh per Institute. This provision shall not be applicable to CSIR Labs and Autonomous Research Institutes under various Ministries of Government of India and State Governments.

iii. The cash contribution (at least 15% / 5% of the approved project cost in case of Industry / MSME respectively) shall be transferred by the Industry / MSME to the accounts of the Project Implementing Institute and a proof of such transfer needs to be submitted to Ministry of Mines within 2 months from the date of release of 1st installment of the project cost by the Ministry of Mines to the Project Implementing Institute.

5. **Scientific and Technical Merit and relevance to Industry: Important instructions:**

i. All organization should follow the instructions given below before submitting the project proposals to the Ministry:-

a. the proposal should be relevant to the overall mandate of mining, exploration, minerals, metals value addition, waste and environmental impact of mining and metallurgical processing
b. industry inputs and participation
c. originality in terms of concept, method, innovation, or in application;
d. development of new methods, synthesis of advanced materials,
e. process improvements and innovation,
f. design of apparatus and other research tools,
g. process development for waste/secondary/low grade materials recovery,

h. zero waste mining, large data analysis and simulation modeling etc.
i. nature of study as experimental, modeling/simulation and both
j. There must be a clear enunciation of objectives and deliverable in the proposal
k. detailing of research methodology, design of experiments, chosen methods of analysis should be appropriate and valid.
l. intended/potential application area has to be made clear in the proposal, industry relevant, may include/involve industry participation if appropriate.
m. potential scalability to pilot plant and later on plant levels
n. what are the techno economic benefits (at least rough estimates).

ii. Science & Technology (S&T) projects are funded through grant-in-aid by the Ministry of Mines through the process of project evaluation by Project Evaluation and Review Committee (PERC) and recommended projects are approved by the Standing Scientific Advisory Group (SSAG) constituted by the Ministry.

iii. The S&T Guidelines, details of terms and conditions and the prescribed proforma are available at SATYABHAMA Portal which may be accessed at research.mines.gov.in. PIs are requested to go through the S&T guidelines and terms and conditions available on the portal.

iv. Project proposals are required to be submitted online on the SATYABHAMA Portal only (research.mines.gov.in) by **31.05.2025**. A User Manual is also available on the Portal where the stepwise procedures for submission of project proposals have been highlighted. Also, a soft copy of the project proposal generated from the Portal in PDF format needs to be sent to the e-mail: met4- mines@gov.in. The PIs who have registered themselves on SATYABHAMA Portal earlier need not register again and can use the same credentials for logging into the portal for project submission. The PIs need not send the hard copy of project proposals. Project proposals submitted in physical mode will not be accepted. The PIs of those projects, which are shortlisted shall be directed to present their proposal either physically (in Delhi or in any other city in India) or through video conferencing, which will be communicated to them. The timelines are as under:

Details	Date
Beginning of PI Registration and Project Submission on SATYABHAMA Portal	17.04.2025
Last date of receipt of proposals	**31.05.2025**
Conducting Preliminary Scrutiny	By 3rd week of June, 2025
Conducting PERC Meeting	By 2nd week of July, 2025
Conducting SSAG Meeting	By 4th week of July, 2025

v. The Grants-in-aid will be governed by the S&T Guidelines of the Ministry of Mines, Government of India's terms and conditions as amended from time to time. The head of the institute may please ensure that no utilization certificate under any project under the S&T Programme Scheme of Ministry of Mines being implemented by their institute is pending for more than one year, for consideration of their project proposals.

vi. For further queries, please email us at: met4-mines@gov.in.